REMARKS

Claims 1-22 are pending. Claims 1 and 18 are amended herein. No new matter has been added by virtue of the amendments, support for the amendments being found in the original claims and throughout the originally filed specification, claims, and figures.

1. Drawings

The drawings are objected to. In particular, it is noted that Figure 1A should be designated by a legend such as --Prior Art--. Applicants submit herewith corrected drawings as requested. Reconsideration and withdrawal of the objection is respectfully requested.

2. 35 U.S.C. 112 Rejections

Claims 18 is rejected under 35 U.S.C. 112, second paragraph. Applicants have amended claim 18 to delete reference to IRGACURE® 651 and have replaced it with its chemical formula. Reconsideration and withdrawal of the rejection is respectfully requested.

3. 35 U.S.C. 102/103 Rejections

Steuck et al.

Claims 1-6, 9-14, and 20 are rejected under 35 U.S.C. 102(a) or, alternatively, under 35 U.S.C. 103(a) over Steuck et al (US 4,618,533).

Applicants respectfully traverse.

Applicants claim, in independent claim 1, a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules. Each difunctional surface-modifying molecule comprises a hydrophobic portion preferentially associated with the substrate and a hydrophilic portion. The surface-modifying molecules are crosslinked to form a crosslinked hydrophilic polymeric network at the surface of the membrane.

Steuck at least fails to teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules, wherein each difunctional surface-modifying molecule comprises a hydrophobic portion and a hydrophilic portion.

The Office asserts that the mono-functional monomer forms Applicants' "hydrophilic portion" (see 3/29/05 Office action, page 5, lines 5-7, "hydrophilic portion includes hydroalkyl methacrylate"). The Office further asserts that Steuck's tetraethylene glycol diacrylate forms Applicants' "hydrophobic portion" (see 11/10/05 Office action, page 4, lines 6-8).

Applicants respectfully traverse.

According to Steuck, a mono-functional monomer, such as acrylic acid, is used to coat the membrane (see, e.g. col. 2, lines 47-53; col. 3, lines 46-60). A separate cross-linker, such as tetraethylene glycol diacrylate (see col. 4, lines 2-4) is used to polymerize the monomer. The mono-functional monomer is hydrophilic. Further, contrary to the Office's assertion, the tetraethylene glycol diacrylate cross-linker is also hydrophillic. The formula for tetraethylene glycol is as follows:

$$CH_2=CH\text{-}C(O)\text{-}O\text{-}CH_2\text{-}CH_2\text{-}O\text{-}CH_2\text{-}CH_2\text{-}O\text{-}CH_2\text{-}CH_2\text{-}O\text{-}CH_2\text{-}CH_2\text{-}O\text{-}C(O)\text{-}CH=CH_2$$

As shown in the formula, the CH_2 groups are surrounded with hydrophilic oxygens. Thus, tetraethylene glycol does not possess a hydrophobic anchor capable of association with the substrate as set forth in Applicants' claims.

Tetraethylene glycol belongs to a family called polyethylene glycols (PEG). PEG is a textbook example of a hydrophilic molecule (See Nikki Einerson, BME, Pharmacy 601 course, School of Pharmacy, University of Wisconsin-Madison)(hereinafter "Einerson") that can be found at the following website:

http://www.pharmacy.wisc.edu/courses/718_430/2000presentation/Einerson.pdf#search='hydrophobic%20anchor%20preferential%20adsorption

PEG is hydrophilic and highly solvated in aqueous solutions (see Einerson, page 1; Structure and General Features of PEG). In order to adsorb PEG, it needs to be chemically linked to a hydrophobic anchor. This adsorption is accomplished by first copolymerizing the PEG with hydrophobic anchor block, resulting in a block copolymer (see Einerson, page 2"Common Types of PEG Surface Modification). For similar statements, see also: Caldwell, K.D., *Surface Modifications with Adsorbed Poly(ethylene oxide)-Based Block Copolymers. Poly(ethylene glycol) Chemistry and Biological Applications,* American Chemical Society, San Francisco, CA (1997) (p.400-419); Karlstrom, G., Engkvist, O., *Theory of Poly(ethylene glycol) in Solution. Poly(ethyleneglycol) Chemistry and Biological Applications;* American Chemical Society, San Francisco, CA (1997)(p. 16-30).

Thus, Steuck does not teach a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules, wherein each difunctional surface-modifying molecule comprises a hydrophobic portion and a hydrophilic portion. Steuck does not teach or suggest that a hydrophobic component is necessarily used to coat the hydrophobic substrate. Rather, Steuck simply cross-polymerizes the hydrophilic polymer over the hydrophobic substrate.

As set forth by Applicants (see page 2, line 27 – page 3, line 18), such methods of modifying hydrophobic surfaces with hydrophilic molecules has several disadvantages such as trapping excessive polymer on the membrane, rapid and irreversible plugging of membrane pores leading to a rapid decline in flow rate and an increase in pressure required to filter molecules through the membrane, high levels of extactables, longer rinsing cycles, and the requirement of significant amounts of coating materials and a long incubation time to achieve a uniformly coated surface. These disadvantages are clearly shown in the examples of Steuck, wherein weight gain, pore blockage and flow reduction are demonstrated.

Applicants, on the other hand, teach a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules, wherein each difunctional surface-modifying molecule comprises a hydrophobic portion and a hydrophilic portion, wherein the hydrophobic portion is preferentially associated with the substrate, and wherein the surface-modifying molecules are crosslinked to form a crosslinked hydrophilic polymeric network at the surface of the membrane.

Applicants' preferential absorption of difunctional surface-modifying molecules reduces the likelihood that crosslinking between polymerized molecules will form the inter-connecting networks, and therefore provides less pore plugging. In fact, the pore sizes of Applicants' coated membrane are substantially the same as the pore sizes of the hydrophobic substrate.

Applicants enclose herewith SEM pictures showing Applicants' coatings. As clearly demonstrated, the coatings are not visible, do not add measurable weight or thickness to the original (uncoated) membranes, and do not cause poor blockage or membrane flow rate reduction.

Further, in view of the above discussion of the cross-linker and monomer materials, Applicants further submit that Steuck's materials are not capable of any significant preferential absorption. As a result, Steuck's membranes have excessive weight gain, pore blockage and flow reduction. Such characteristics provide structural differences between the membranes of Steuck and those of Applicant.

Applicants' preferential absorption of difunctional surface-modifying molecules reduces the likelihood that crosslinking between polymerized molecules will form the inter-connecting networks, and therefore provides less pore plugging. In fact, the pore sizes of Applicants' coated membrane are substantially the same as the pore sizes of the hydrophobic substrate.

Thus, it is clear that Steuck at least fails to teach or suggest that a hydrophobic substrate is coated with difunctional surface-modifying molecules, wherein each molecule has both a

hydrophobic portion and a hydrophilic portion, and wherein the hydrophobic portion is preferentially absorbed to the substrate. Rather, Steuck merely describes the polymerization of a hydrophilic polymer over a hydrophobic substrate utilizing a crosslinker which is also hydrophilic.

Accordingly, claim 1 is patentable over Steuck. Claims 2-6, 9-14, 20, and new claims 48-49 depend from claim 1 and, likewise, are patentable over Steuck. Reconsideration and withdrawal of the rejection is respectfully requested.

Wang et al.

Claims 1-6, 9-14, and 16-20 are rejected under 35 U.S.C. 102(b) or, alternatively, under 35 U.S.C. 103(a) over Wang et al (US 5,137,633).

Applicants respectfully traverse for the same reasons as set forth above regarding Steuck.

Wang describes coating a substrate with a mono-functional monomer, such as hydroalkyl methacrylate (see col. 4, lines 37-42). A separate cross-linker, such as tetraethylene glycol diacrylate (see col. 4, lines 61-65) is used to polymerize the monomer. Both mono-functional monomer and the tetraethylene glycol diacrylate cross-linker are hydrophilic.

Accordingly, claim 1 is patentable over Wang. Claims 2-6, 9-14, 20, and new claims 48-49 depend from claim 1 and, likewise, are patentable over Wang. Reconsideration and withdrawal of the rejection is respectfully requested.

Ying et al and UV Refinish Primer and Clear Coat

Claims 1-19 are rejected under 35 U.S.C. 102(b) or, alternatively, under 35 U.S.C. 103(a) over Ying et al (US 6,183,901) and "UV Refinish Primer and Clear Coat".

Applicants respectfully traverse.

Ying describes two microporous pseudo-boehmite layers and protective coating layer comprising a polymer interposed between the microporous pseudo-boehmite layers (see abstract and figures) or one pseudo-boehmite layer with a protective coating layer adjacent to one outer surface of the microporous pseudo-boehmite layer (see col. 3, line 45).

Ying at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules having a hydrophobic portion preferentially associated with the substrate.

Ying's substrate is formed of pseudo-boehmite, which is hydrated aluminum oxide having chemical formula Al_2O_3 x H2O, and which is inorganic and hydrophillic. Further, Ying does not teach or suggest preferential adsorption of a hydrophobic portion of a molecule on the surface of the phobic substrate.

Still further, Applicants note that Ying does not teach or suggest coating the inner surface of the pores of the phobic substrate. Rather, Ying describes the selection of monomers "to form the protective coating layer" that "does not significantly impregnate into pores of the microporous pseudo-boehmite layer." (see col. 21, lines 53-57)

Applicants further submit that such structural differences between Applicants' membranes and those of Ying are clearly demonstrated by the enclosed SEM pictures showing Applicants' coatings. Ying describes a layered structure, which is nothing like the structure of Applicants' membranes.

UV Refinish Primer and Clear Coat does not remedy the above-noted deficiencies in Ying.

Accordingly, claim 1 is patentable over Ying and "UV Refinish Primer and Clear Coat". Claims 2-19, and new claims 48-49 depend from claim 1 and, likewise, are patentable over Ying

and "UV Refinish Primer and Clear Coat". Reconsideration and withdrawal of the rejection is respectfully requested.

Ying et al and Hoshi et al

Claim 20 is rejected under 35 U.S.C. 103(a) over Ying et al (US 6,183,901) and Hoshi et al (US 6,299,653).

Applicants respectfully traverse for the reasons set forth above regarding Ying.

Hoshi is merely cited for the assertion that Hoshi teaches that polyvinyldiene fluoride is ionically conductive. However, Hoshi does not remedy the above-noted deficiencies in Ying.

Accordingly, claim 1 is patentable over Ying and Hoshi. Claim 20 and new claims 48-49 depends from claim 1 and, likewise, is patentable over Ying and Hoshi. Reconsideration and withdrawal of the rejection is respectfully requested.

CONCLUSION

In view of the foregoing, applicants request reconsideration and allowance of claims 1-22 and 48-49.

It is believed that no fees are required for consideration of this response. However, if for any reason the fee paid is inadequate or credit is owed for any excess fee paid, the Office is hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,

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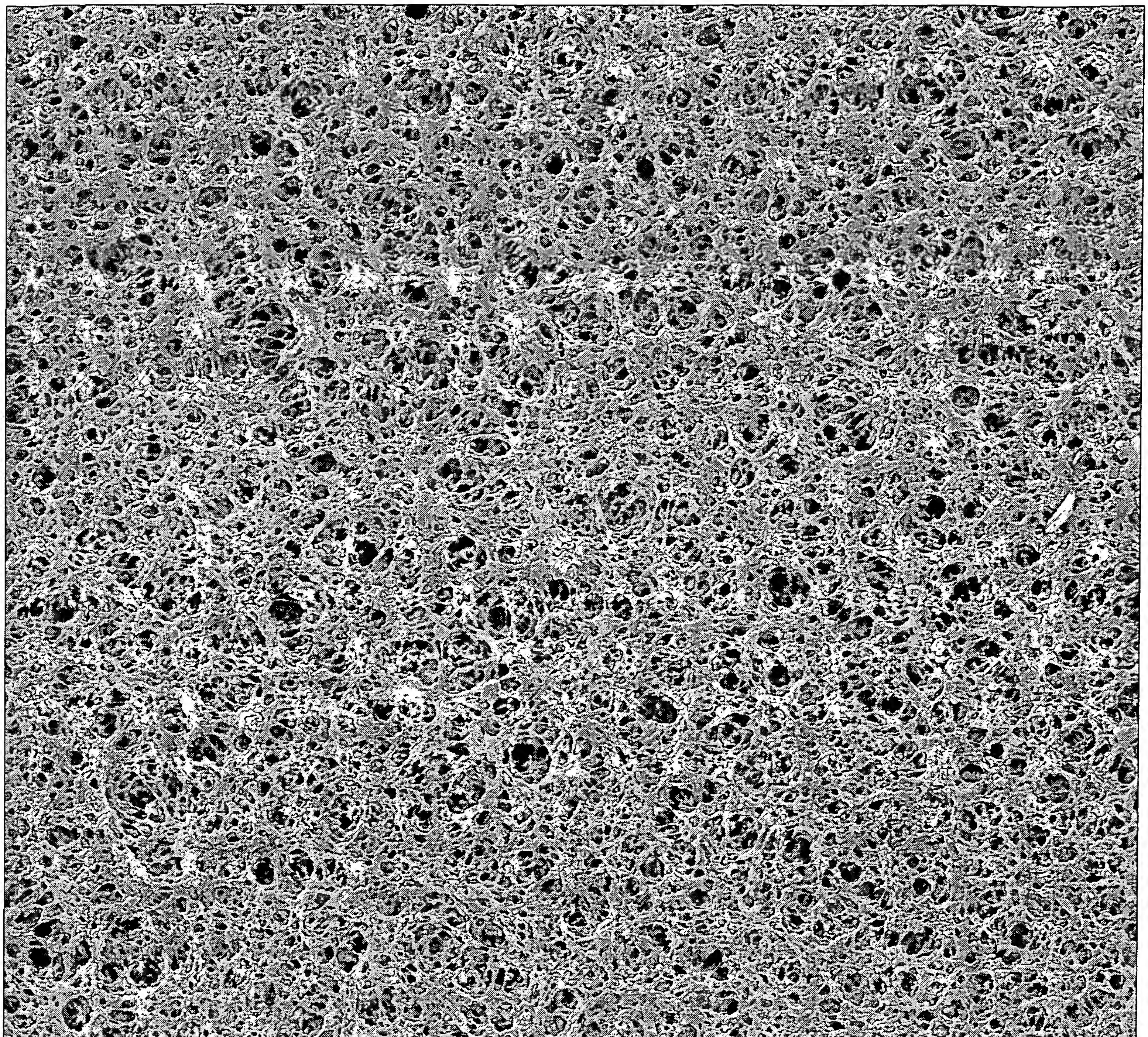

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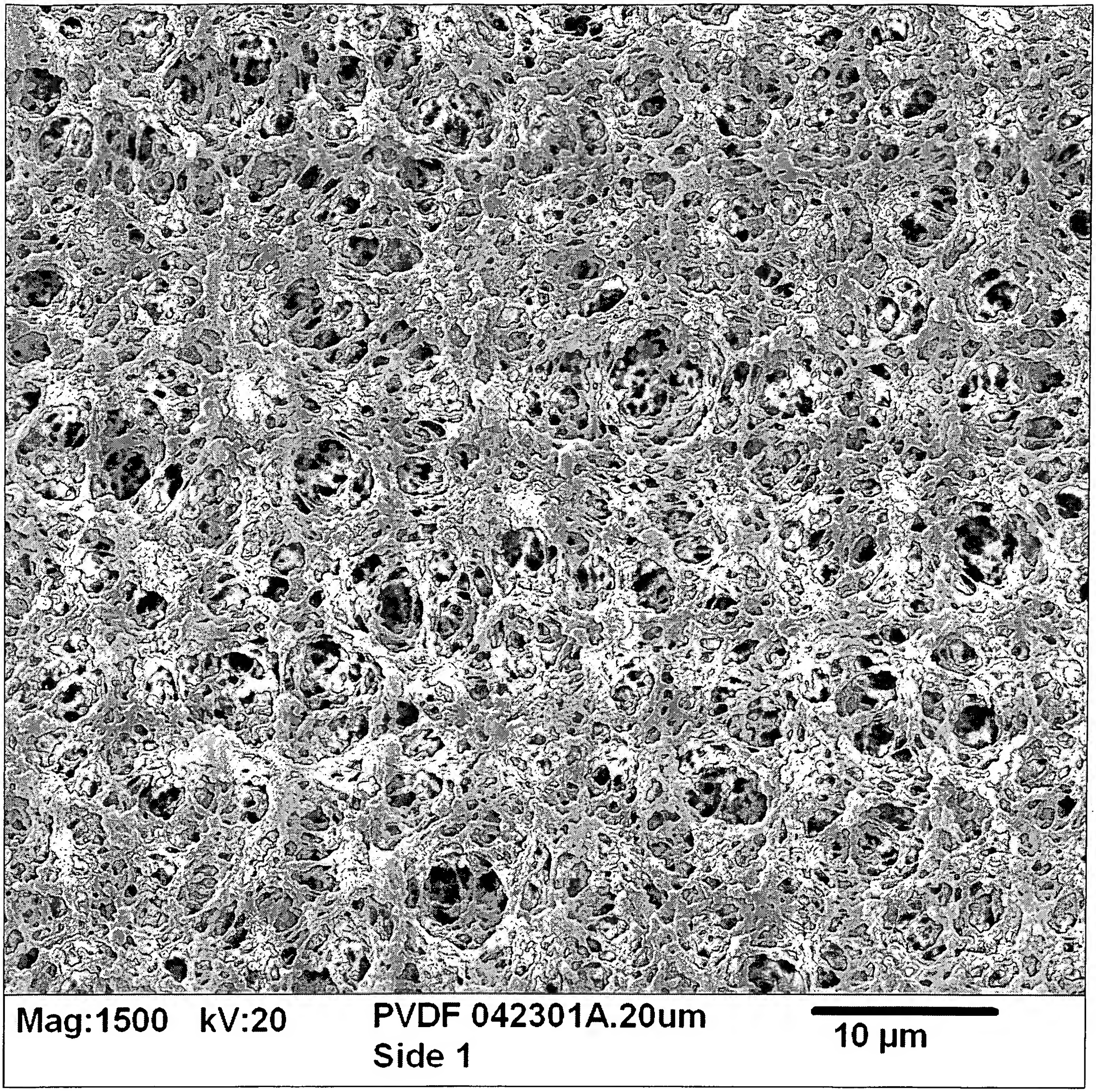
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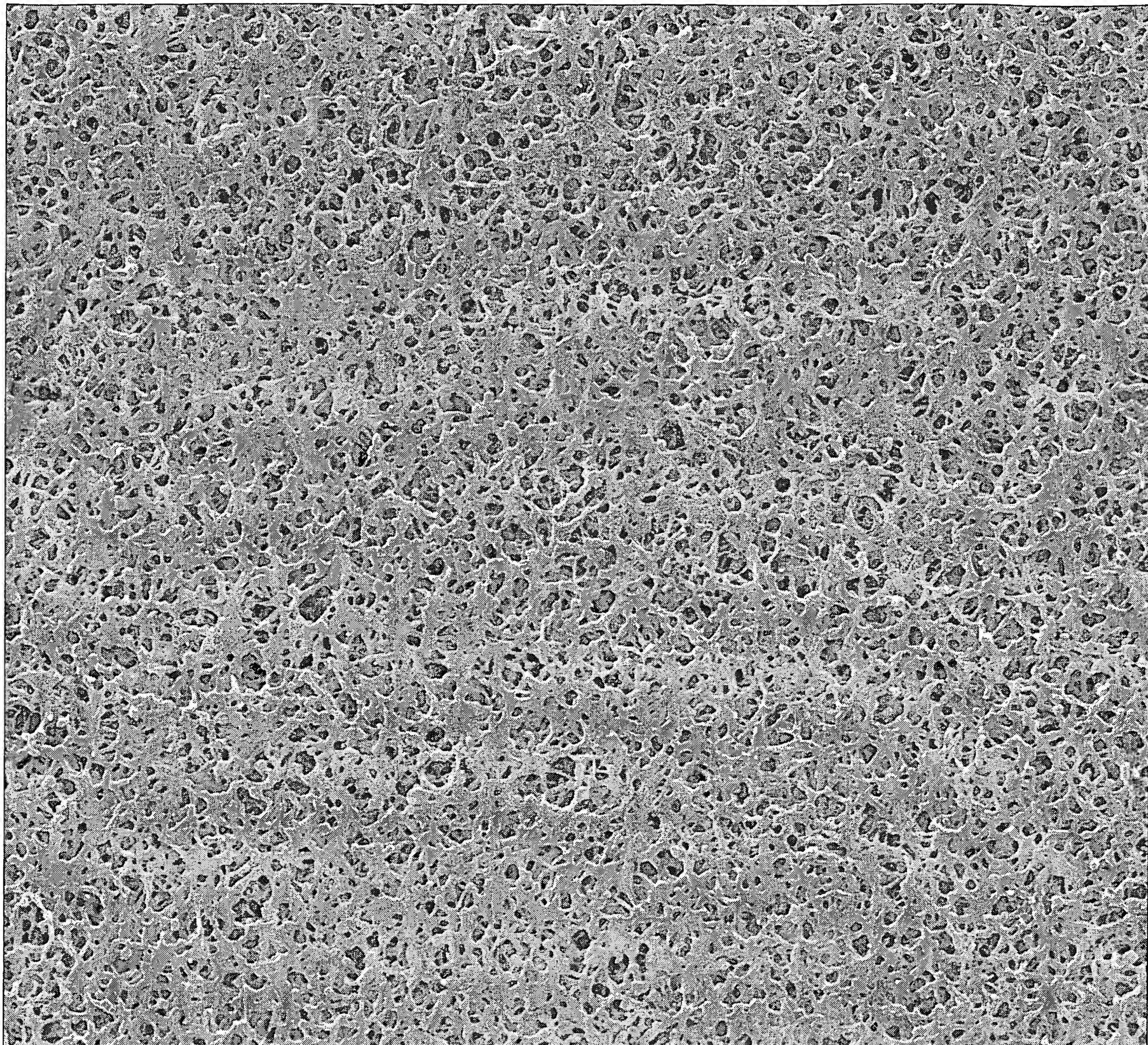

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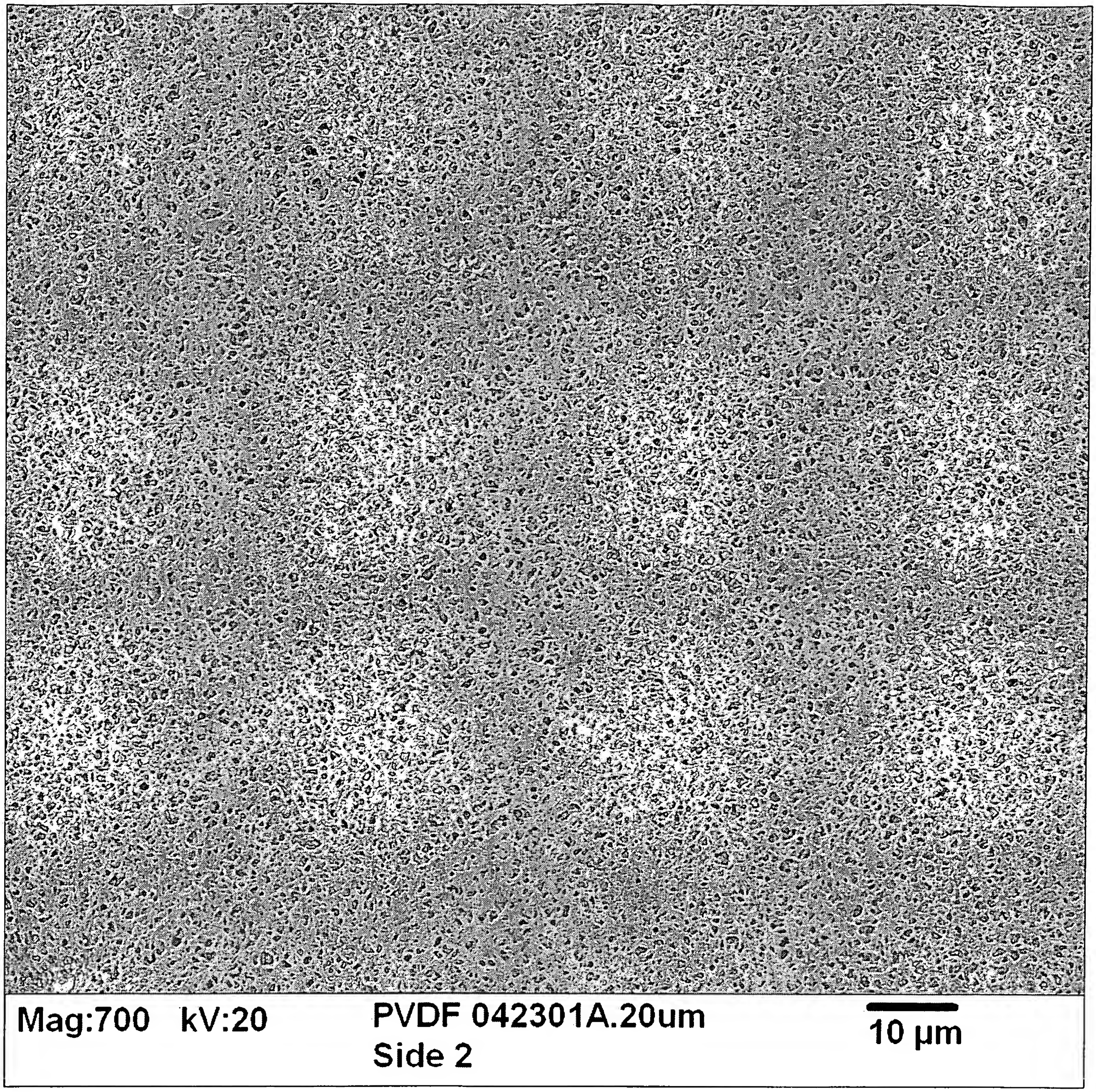
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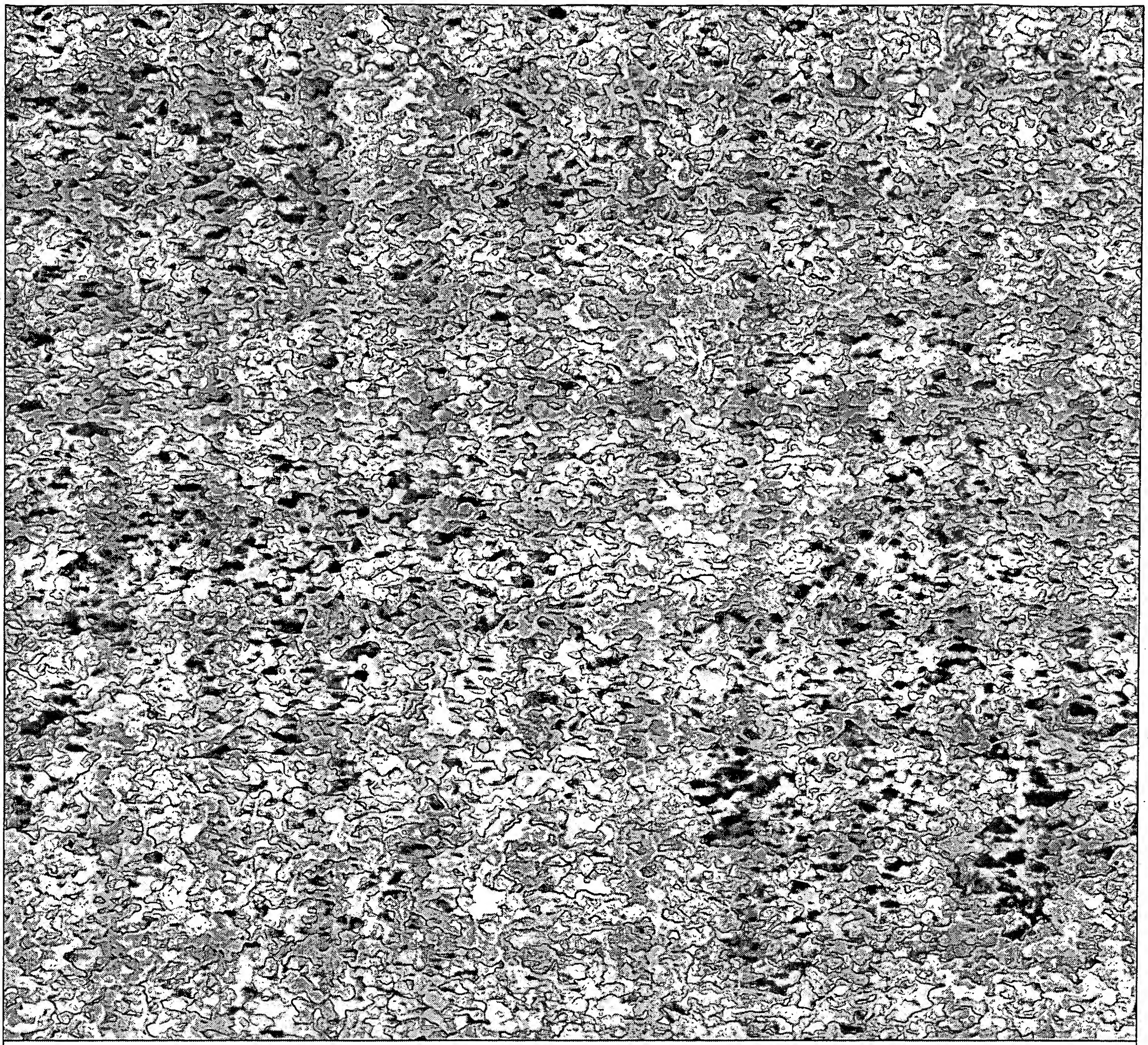
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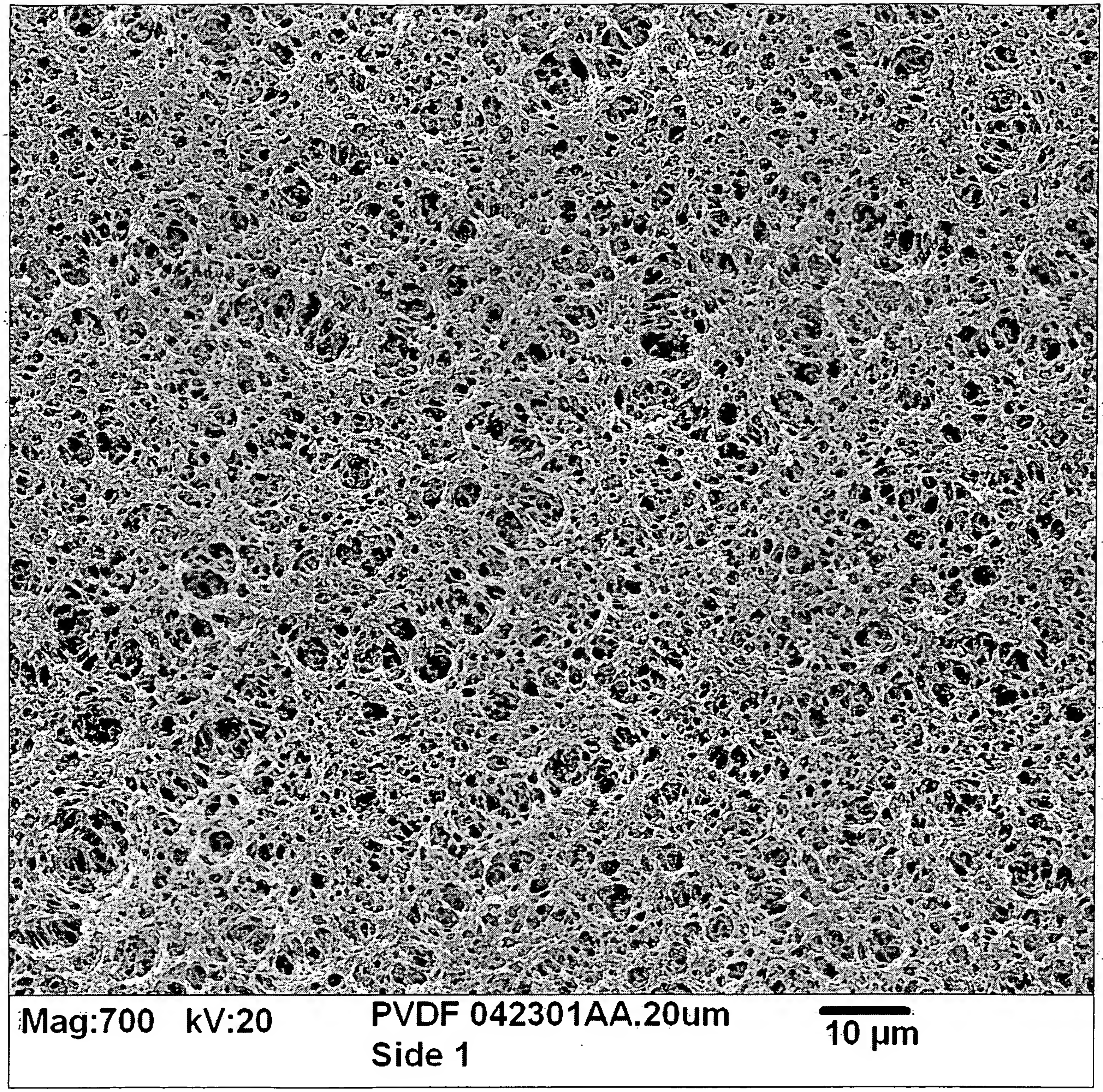
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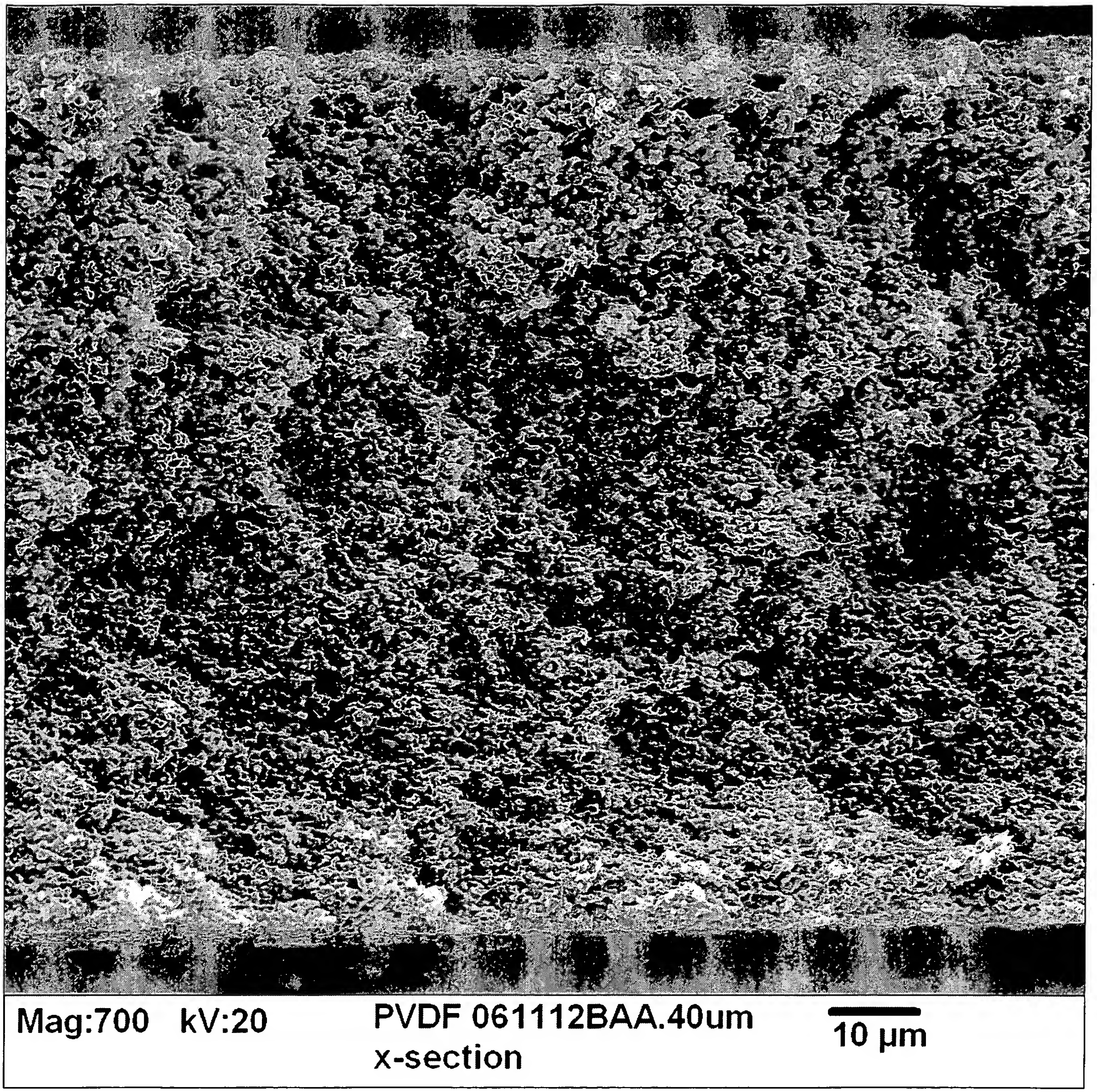
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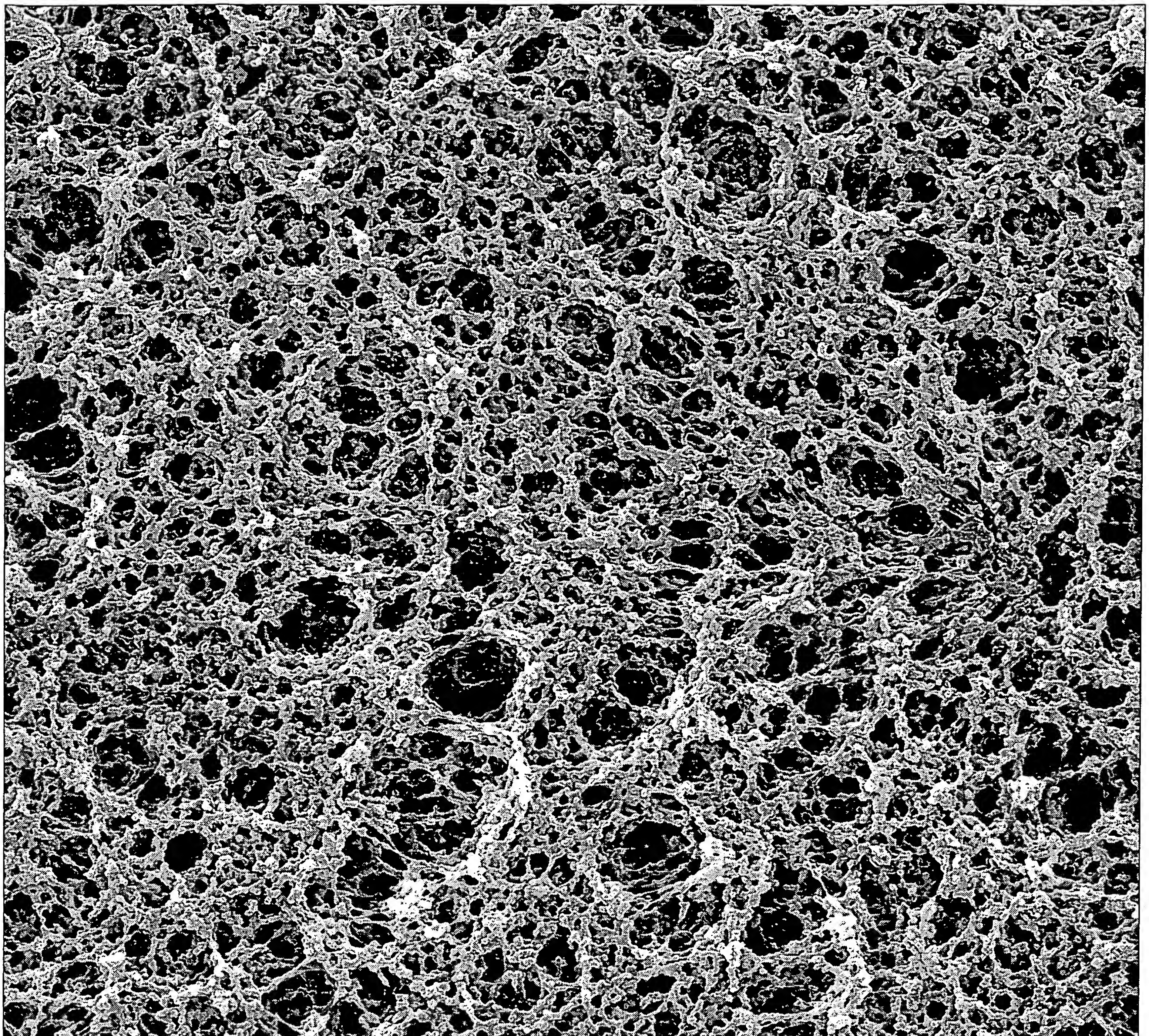

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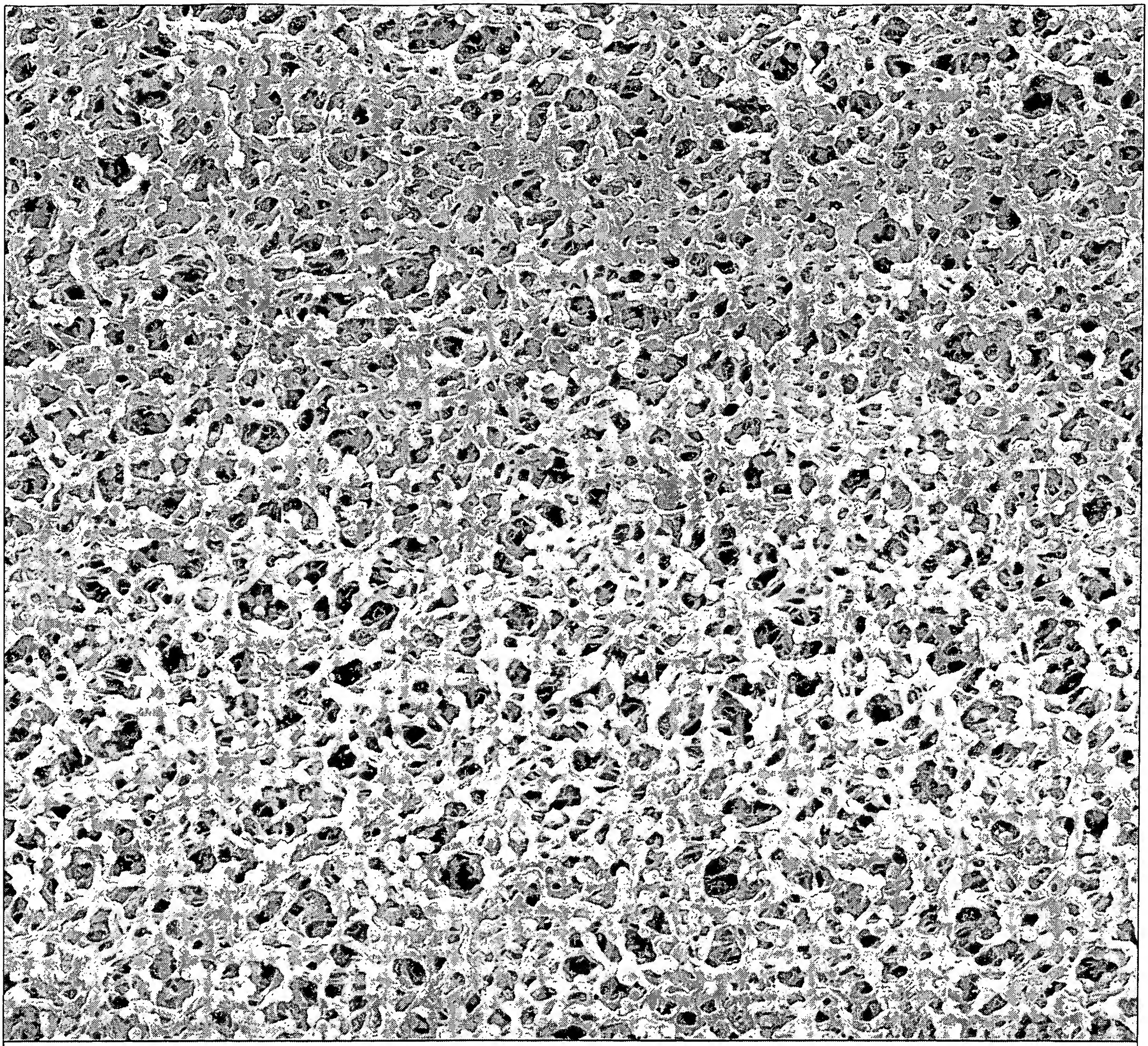

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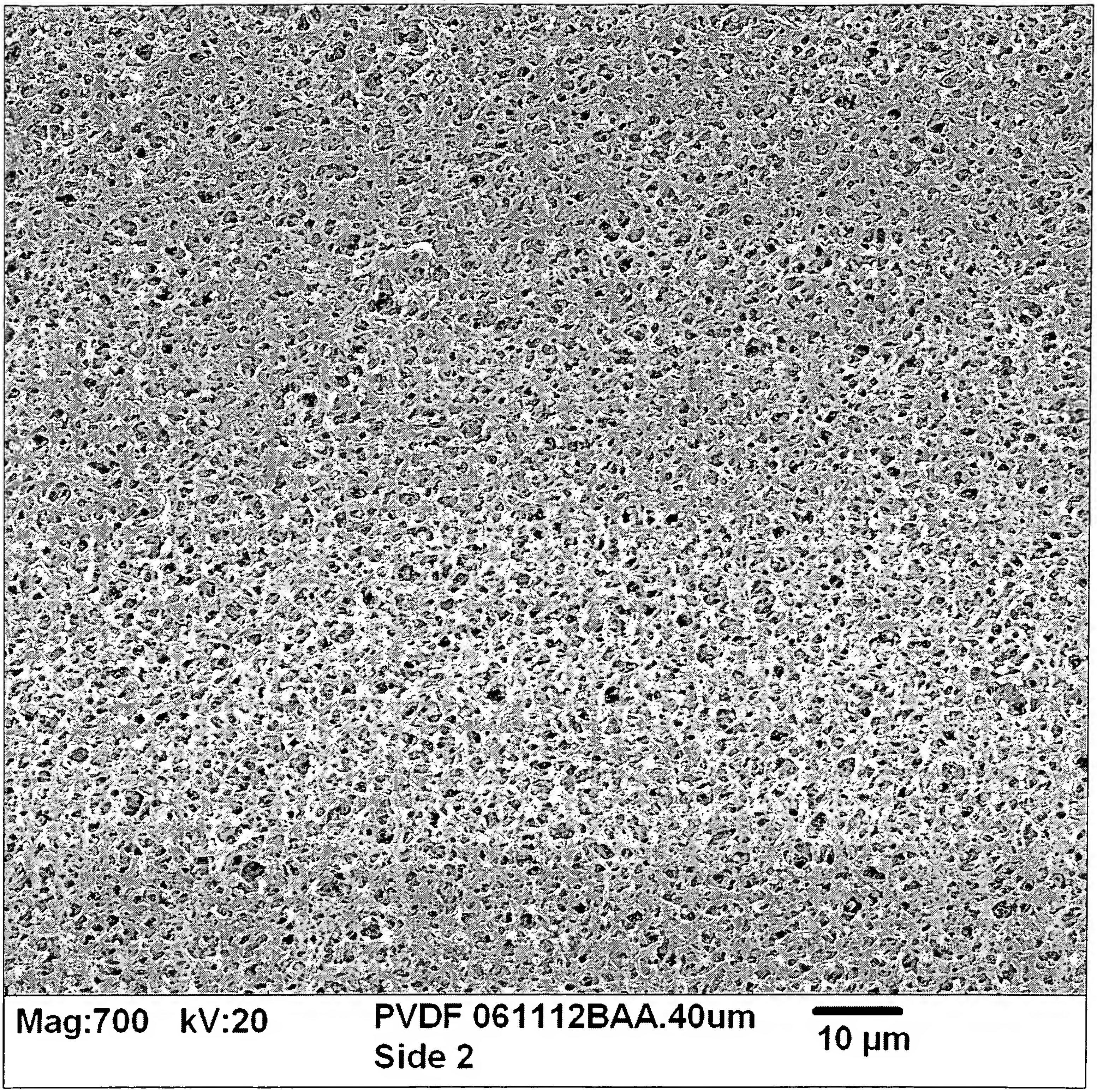
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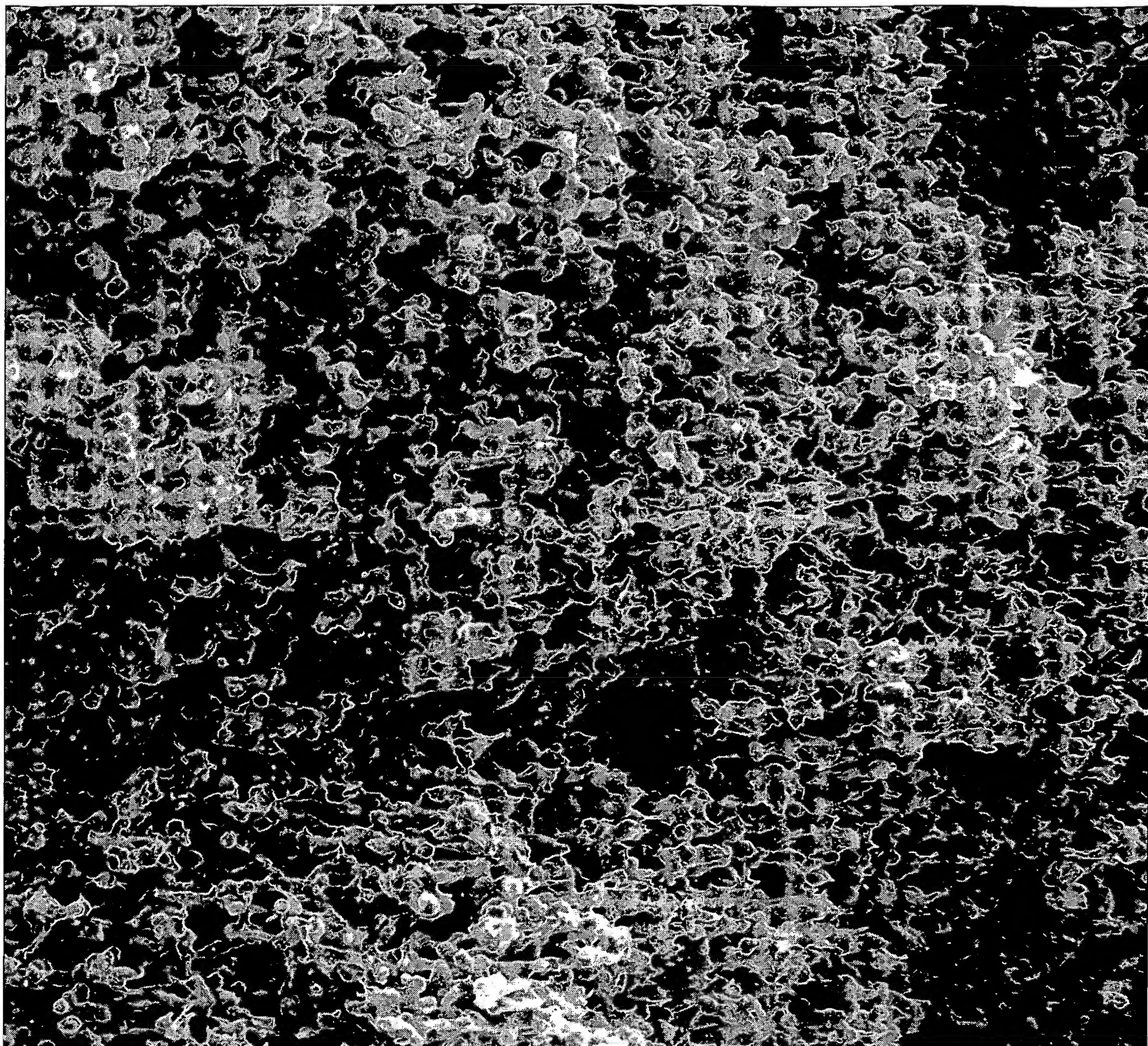

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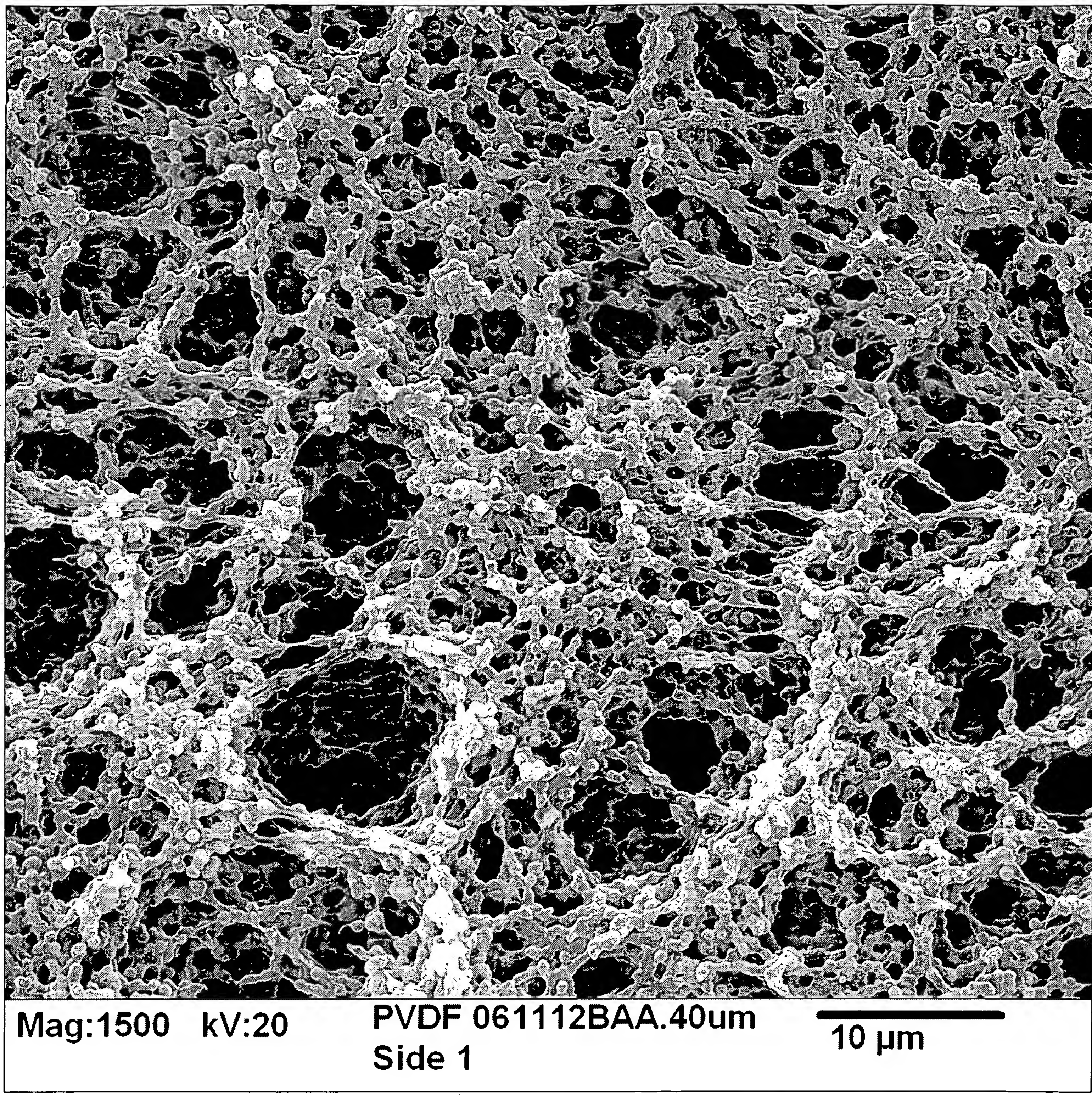
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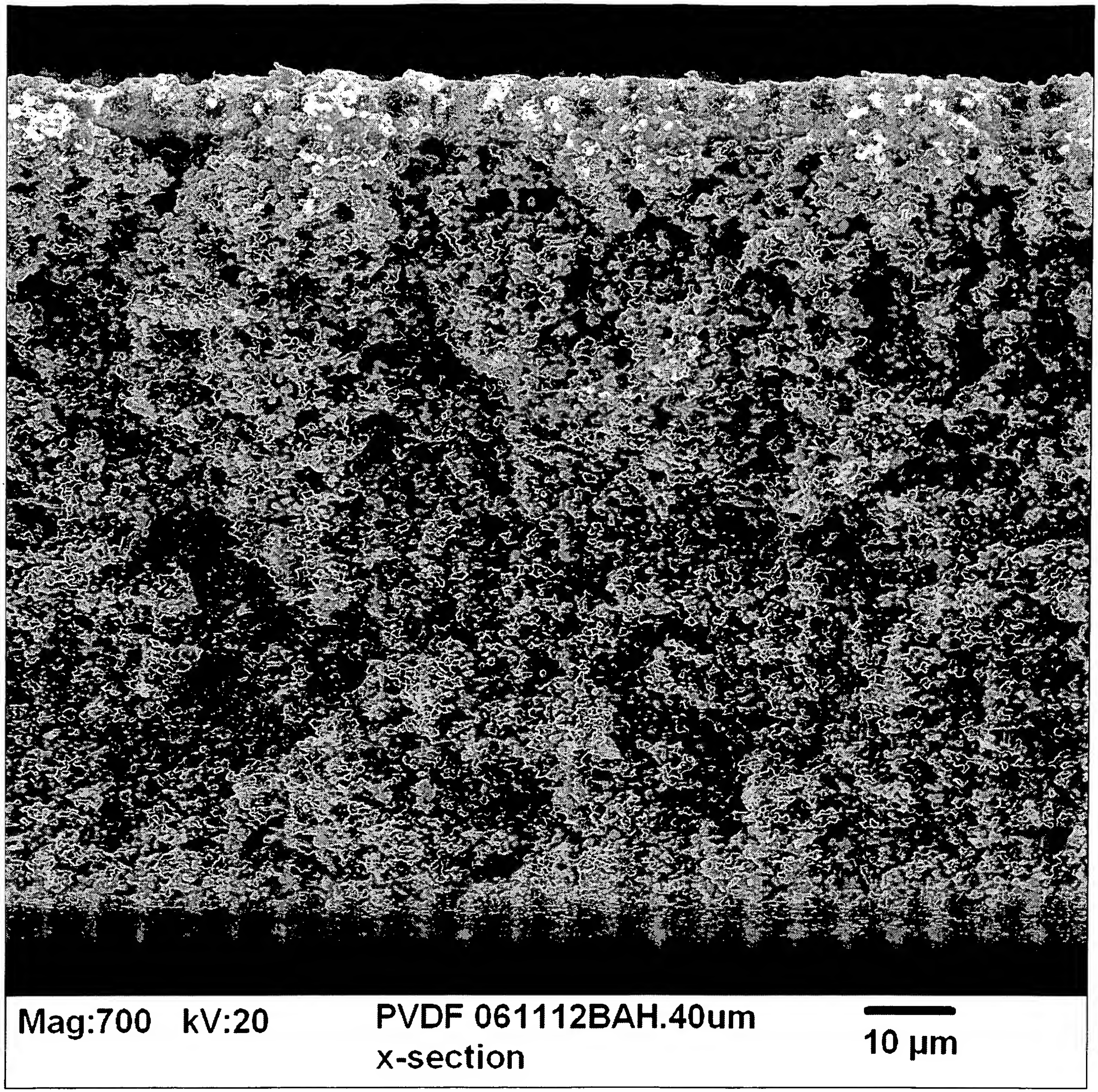
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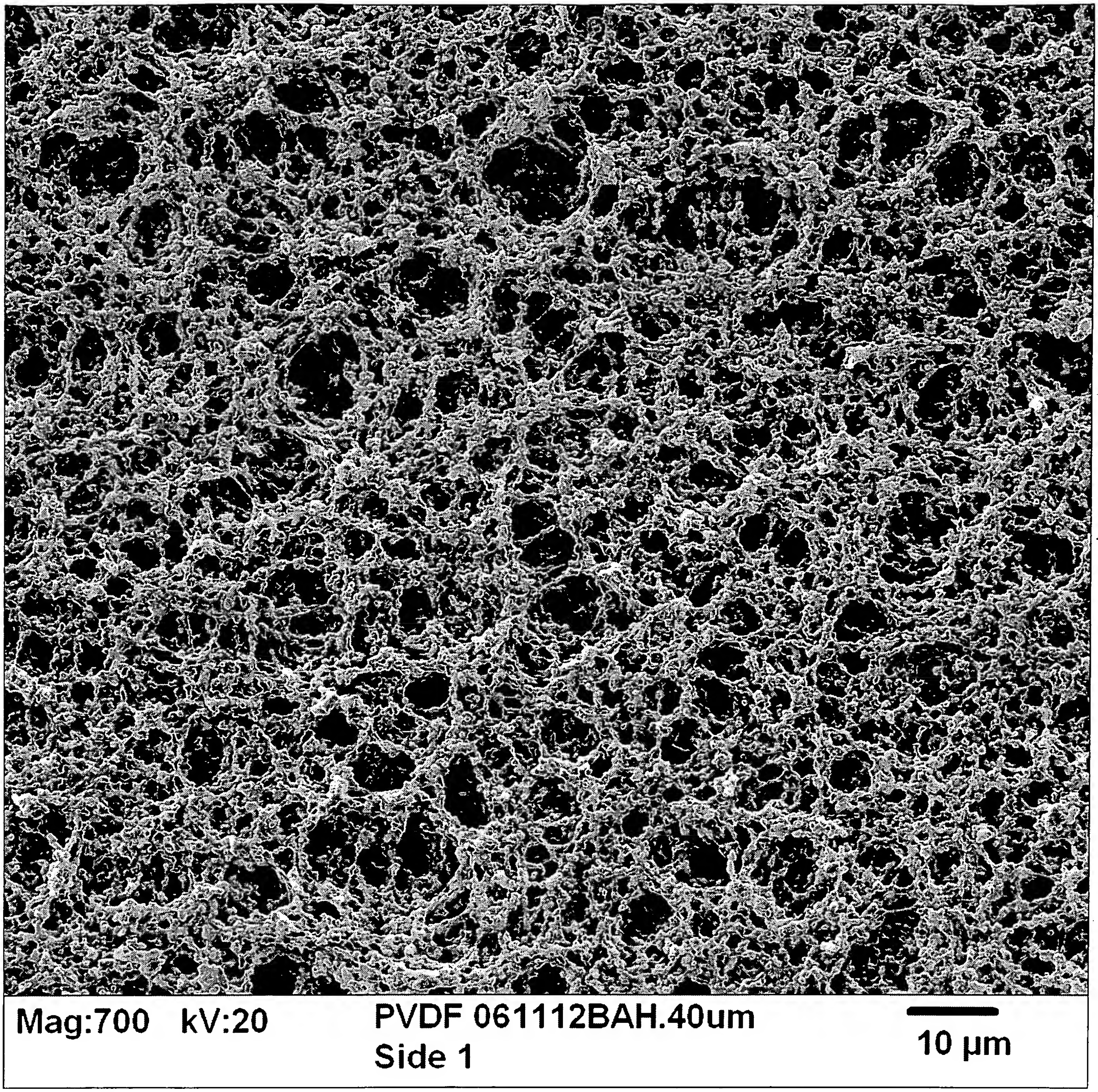
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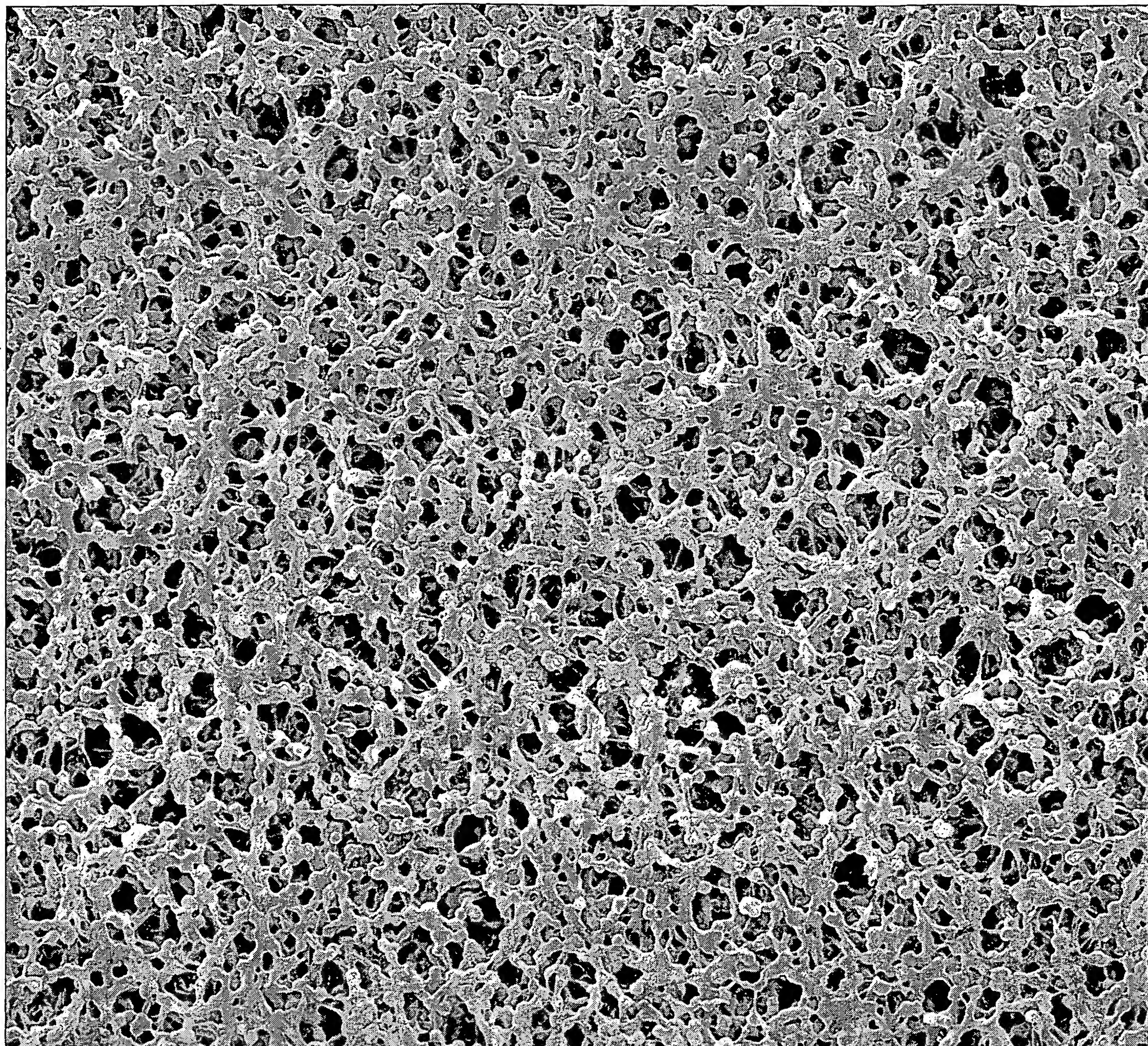

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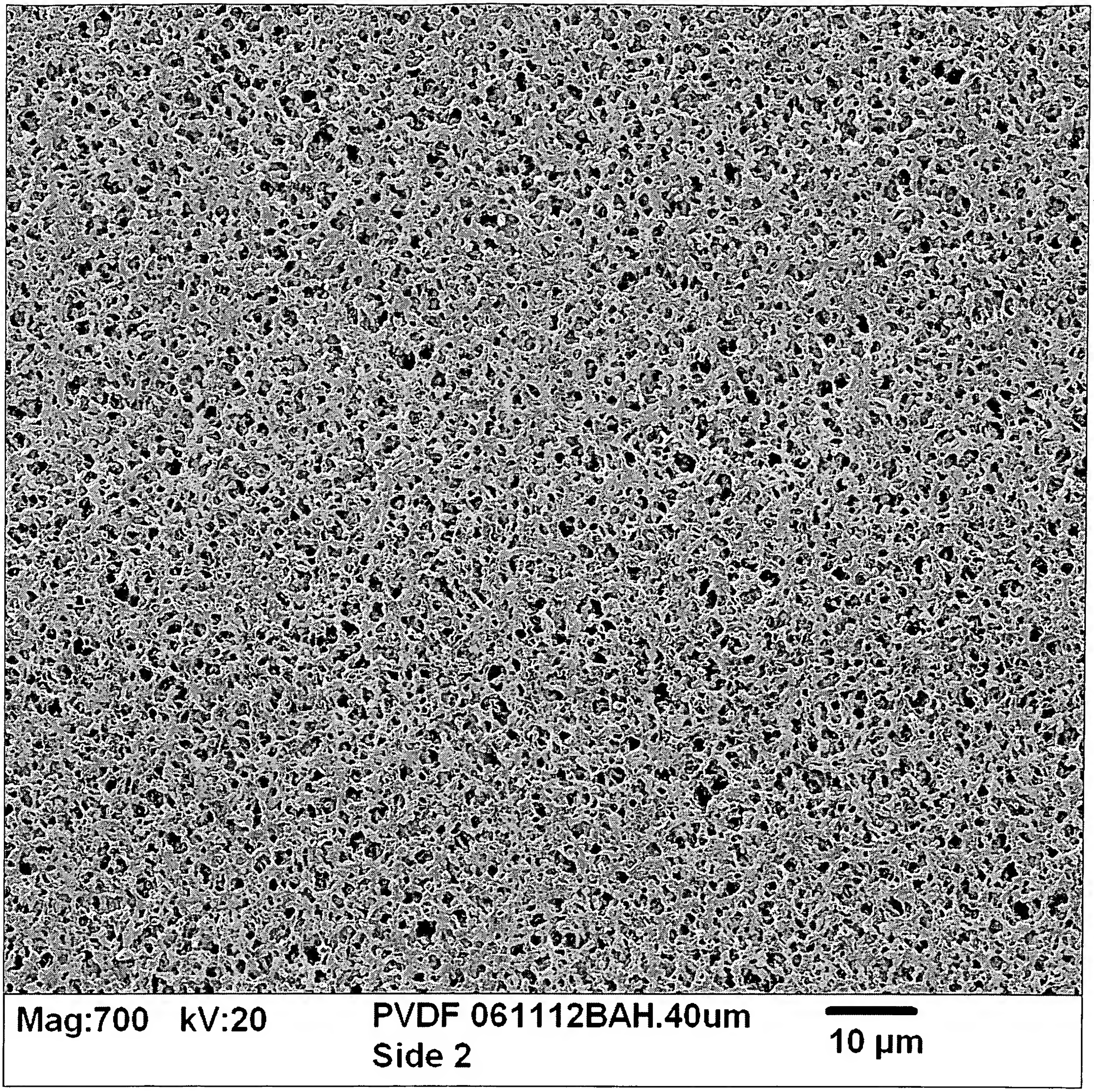
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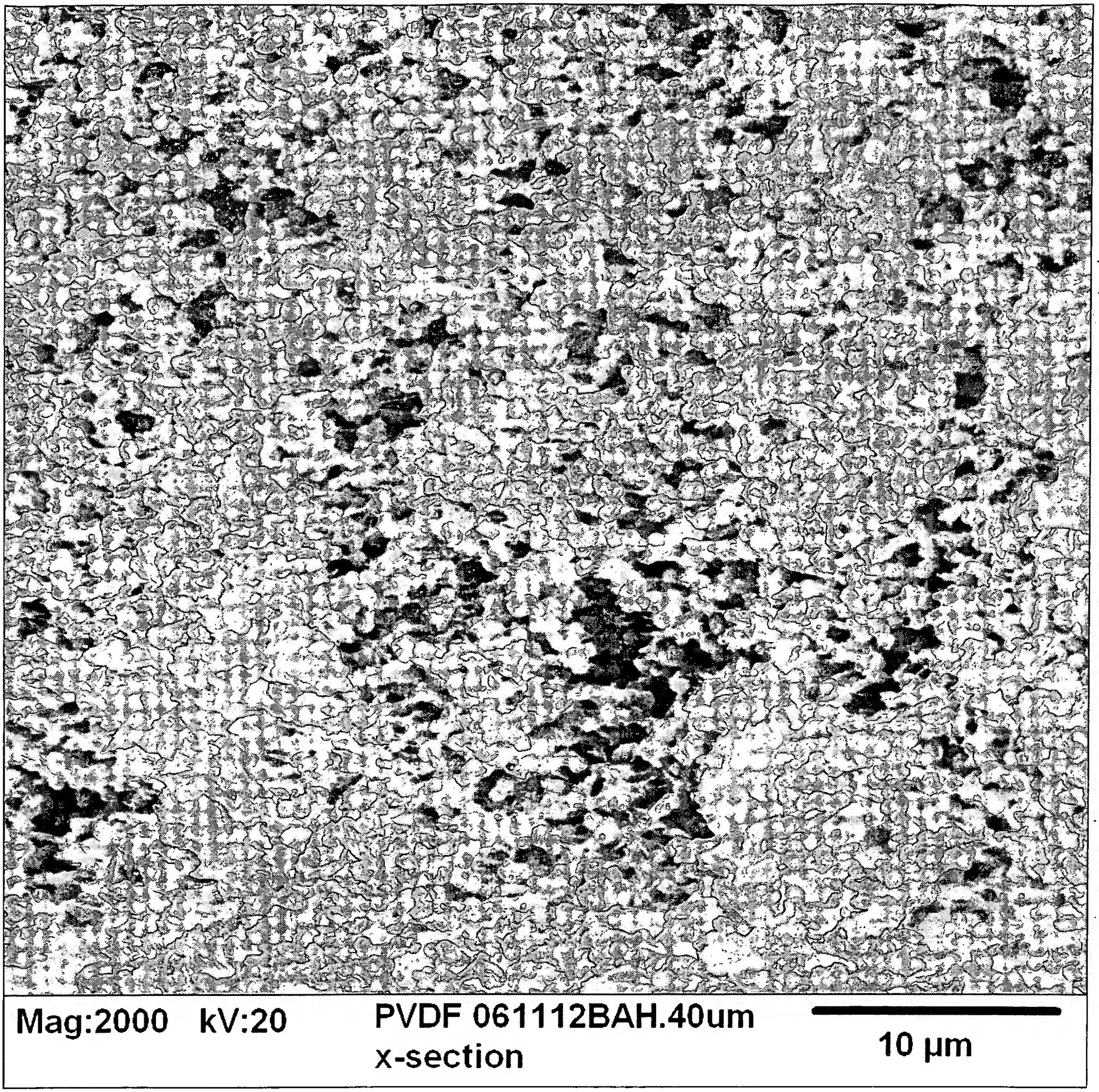
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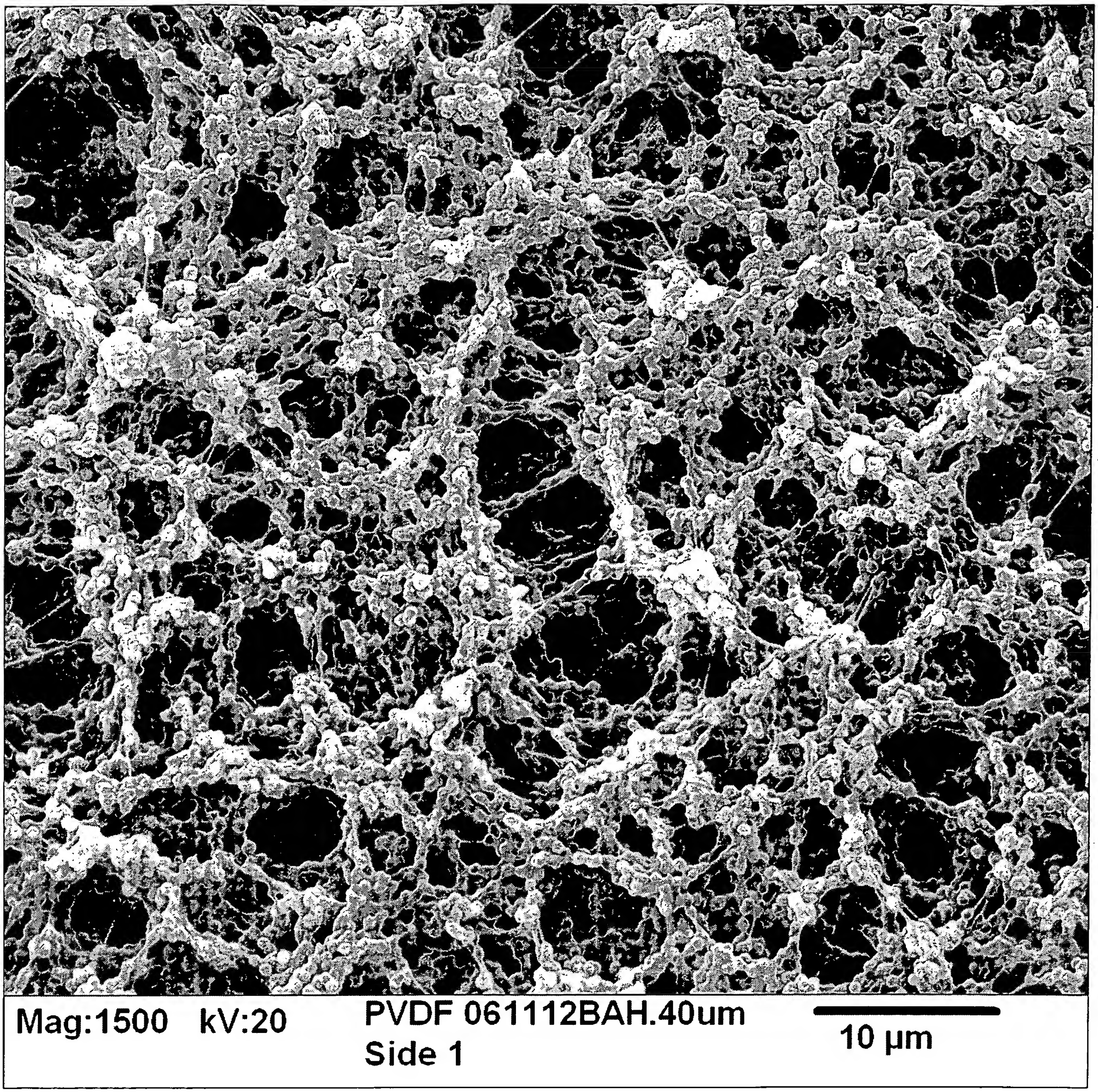
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